Govt. V.Y.T. PG. Autonomous College
Durg, C.G., India, 491001

(Erstwhile: Govt. Arts & Science College, Durg)

Reaccredited Grade "A+" by NAAC College with potential for excellence

CPE Phase-III by UGC Awarded Star College by DBT, New Delhi

Educational Tour Reports

Organized By

Department of Mathematics

Session 2024-25

Funded by

Rashtriy Uchchatar Shiksha Abhiyan
(RUSA)

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Educational Tour Report
on
One Day Problem Solving Workshop
for
Madhava Mathematics Competition, 2025
at
B.C.S. Govt. PG. College, Dhamtari, C.G.

Organized By

Department of Mathematics

Session 2024-25

Key Highlights

The Inception

Professor Rakesh Tiwari and Professor Nidhi Sharma accompanied a batch of 9 students (5 boys and 4 girls) towards a college campus of BCG around 8 AM. The morning was filled with a sense of anticipation, as everyone was eager to visit the renowned campus. It was a bright, sunny day, and the weather was pleasant with a gentle breeze that set the perfect atmosphere for the trip.

As we arrived at our campus, the students were excited to explore a new environment and experience the campus life at BCG. We were led by Professor Tiwari, who had previously visited the BCG campus and knew the best routes and places to visit there. The professors briefed the students about the plan for the evening and emphasized the importance of making the most out of this trip.

After a brief introduction about the campus, we headed straight to the student dining area for a light breakfast. Since we had to travel for a span of around 4 hours, and a warm meal was much-needed. The breakfast spread was simple yet delicious, with a variety of local delicacies such as poha, parathas, and fresh fruit juices.

Arrival at Govt. B.C.S. PG. College, Dhamtari

The batch of students, accompanied by Professors Rakesh Tiwari and Nidhi Sharma, reached BCS Govt College, Dhamtari, at approximately 11:00 AM. Upon arrival, we were greeted warmly by the college faculty and staff. Prof. Nidhi Sharma led the group on an exploration of the college campus, giving us a tour of the various academic buildings, libraries, and recreational areas. The college campus was well-maintained, with lush green spaces and modern facilities that impressed everyone in the group.

Welcome Ceremony

At noon, a formal welcome ceremony was held in our honour. The ceremony was attended by various faculty members of the college, including senior professors and administrative staff. The event was a delightful introduction to the college's culture and values, and the atmosphere was both welcoming and enthusiastic. The ceremony lasted for about an hour, and the students were given an opportunity to interact with the faculty, learn about the college's history, and gain insight into its educational approach.

Lecture by Prof. Rajendra Pawale

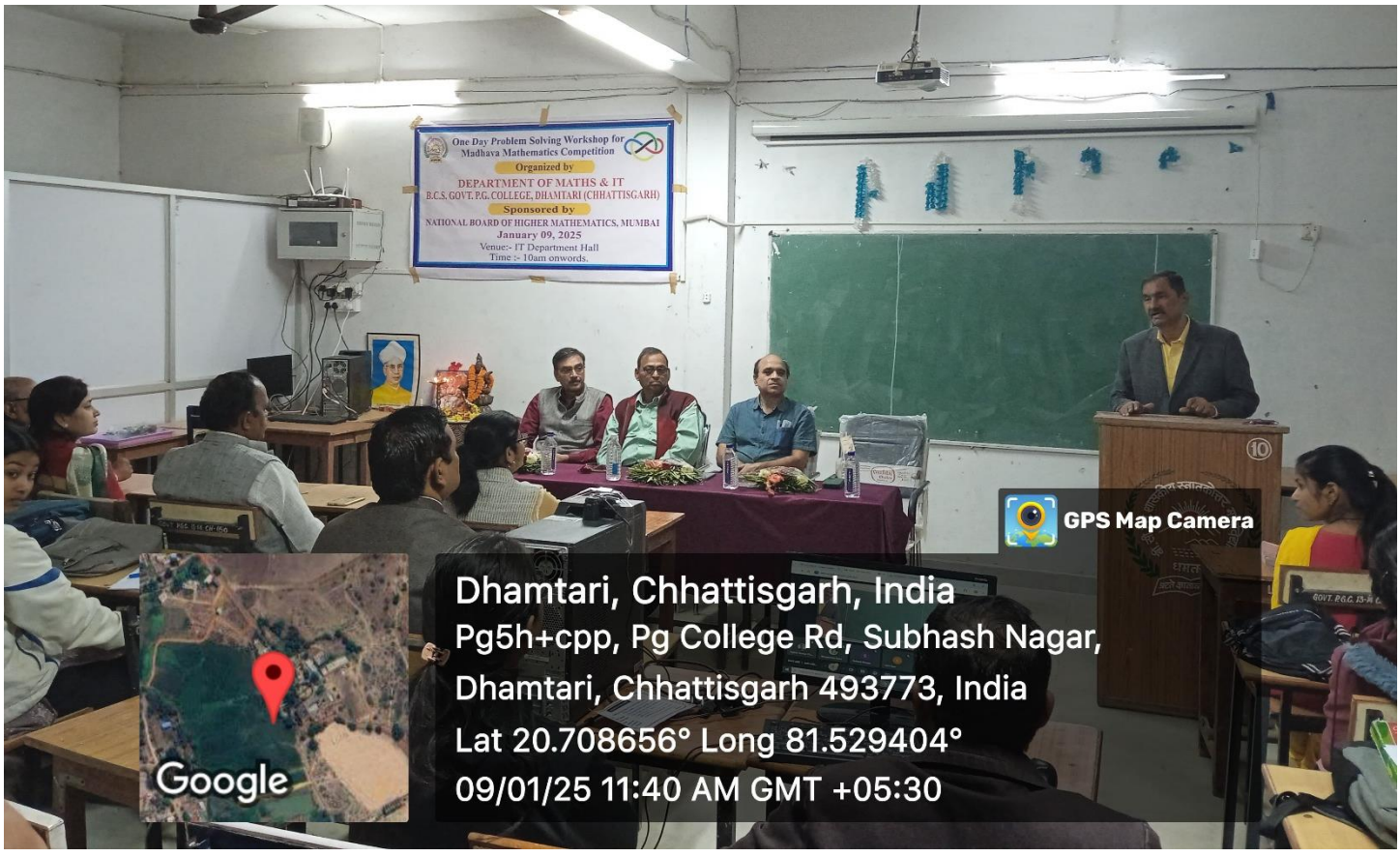
Following the welcome ceremony, we proceeded to the lecture hall, where the first lecture of the day was delivered by Prof. Rajendra Pawle (University of Mumbai), a distinguished professor from the University of Mumbai. His lecture on "Competitive Mathematical Aspects" was highly engaging, focusing on the application of mathematical principles in competitive environments. Prof. Pawle's depth of knowledge and ability to simplify complex concepts made the lecture both informative and thought-provoking for all attendees.

Break

A short break was provided after the lecture, allowing students to refresh themselves and reflect on the lecture's contents. This brief respite lasted for about 15 minutes, after which we returned to the venue for the next session.

Lecture by Dr. V. K. Pathak on Real-Life Applications of Mathematics

At 2:15 PM, we were introduced to V.K. Pathak, an expert in the field of mathematics and its real-world applications. V.K. Pathak's session was both practical and insightful. He provided a real-life perspective on mathematical competitions, highlighting how mathematical tools and techniques are applied in various fields to solve real-world problems. The students were particularly keen on the strategies, tools, and tactics that Pathak shared to approach mathematical challenges, and it was clear that this session had a profound impact on their understanding of mathematics in the professional world.



Lecture by Dr. Rakesh Tiwari on Pigeon Hole Principle

The Pigeonhole Principle is a simple, yet powerful concept in combinatorics (the branch of mathematics dealing with counting and arrangements). It states: If you have more items (pigeons) than containers (pigeonholes), and you want to place all items into the containers, at least one container must contain more than one item.

End of the Workshop

By 3:00 PM, the first day's workshop concluded. The students were eager to absorb more knowledge, but it was time for a brief rest before the next set of activities. The academic portion of the day was successfully completed, leaving the students with a greater appreciation of mathematical applications in real-world scenarios.

Refreshments and Departure for Angar Moti Mata Mandir

After the workshop, we were provided with refreshments, which included light snacks and beverages to help recharge for the upcoming activities. Around 4:00 PM, the group departed for a visit to the Angar Moti Mata Mandir, located nearby. Professors Rakesh Tiwari and Nidhi Sharma accompanied the students, and the visit offered a peaceful and spiritual break from the academic schedule.

Visit to Gangrel Dam

Following our visit to the temple, the group proceeded to Gangrel Dam, arriving by 5:30 PM. The scenic beauty of the dam and its surrounding area left everyone in awe. The view of the vast reservoir and the peaceful ambiance was perfect for unwinding after a day of academic activities.

Return to College

By 8:00 PM, the day's activities had come to an end. We headed back to the college campus (Govt. V.Y.T. PG, Autonomous College, Durg) after an action-packed day. The students were tired but filled with excitement from the day's experiences.

List of participants

Dr. Rakesh Tiwari **Assistant Professor** **and** **Mrs. Nidhi Sharma** **Assistant Professor (Guest)** **Department of Mathematics** **Govt. V.Y.T. Autonomous College, Durg**	1. **Falguni Bharti (B.Sc. VI Sem)** 2. **Akshat Tiwari (B.Sc. VI Sem)** 3. **Om Rajput (B.Sc. IV Sem)** 4. **Priya Dhimar (B.Sc. IV Sem)** 5. **Shivani (B.Sc. IV Sem)** 6. **Rajan Barley (B.Sc. IV Sem)** 7. **Khushi Sahu (B.Sc. IV Sem)** 8. **Vibhanshu (B.Sc. IV Sem)** 9. **Shashwat Mishra (B.Sc. IV Sem)**

CERTIFICATE

This is to certify that Prof./Shri Vikhaneku Sahu (B.Sc. IIIrd Sem.) from Govt. V.Y.T. PG. College, Durg Participated in "One Day Problem Solving Workshop" for Madhava Mathematics Competition 2025 Organized by Department of Maths & IT, B.C.S. Govt. P.G. College, Dhamtari (Chhattisgarh) funded by National Board of Higher Mathematics, Mumbai on January 09, 2025

This is certified that ——— took class for students Registered for the competition.

Dr Vinod Kumar Pathak
Principal
B.C.S. Govt PG College Dhamtari (C

CERTIFICATE

This is to certify that Prof./Shri Khushi Sahu (B.Sc. IIIrd Sem.) from Govt. V.Y.T. P.G. College, Durg Participated in "One Day Problem Solving Workshop" for Madhava Mathematics Competition 2025 Organized by Department of Maths & IT, B.C.S. Govt. P.G. College, Dhamtari (Chhattisgarh) funded by National Board of Higher Mathematics, Mumbai on January 09, 2025

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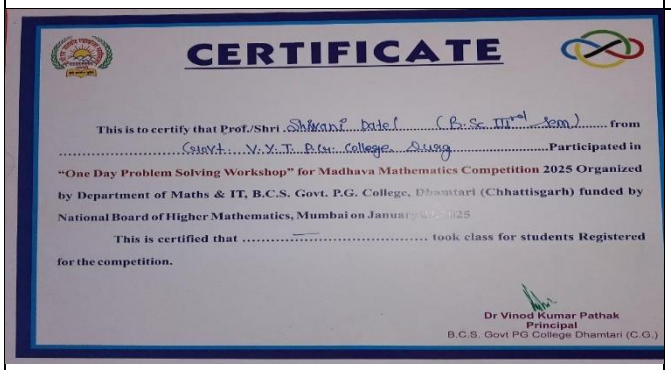

CERTIFICATE

This is to certify that Prof./Shri Shivani Dalel (B.Sc. IIIrd Sem.) from Govt. V.Y.T. P.G. College, Durg Participated in "One Day Problem Solving Workshop" for Madhava Mathematics Competition 2025 Organized by Department of Maths & IT, B.C.S. Govt. P.G. College, Dhamtari (Chhattisgarh) funded by National Board of Higher Mathematics, Mumbai on January 09, 2025

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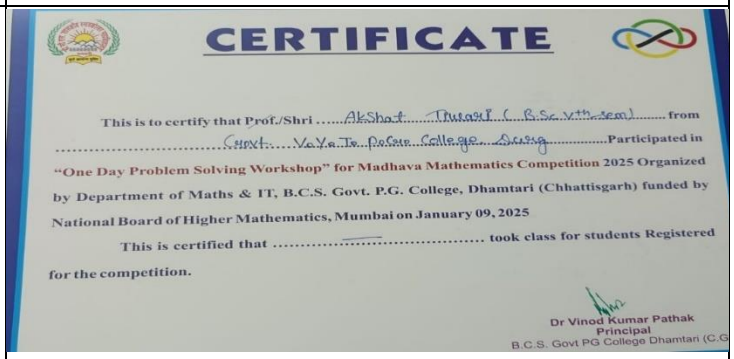

CERTIFICATE

This is to certify that Prof./Shri Akshat Tiwari (B.Sc. Vth Sem.) from Govt. V.Y.T. P.G. College, Durg Participated in "One Day Problem Solving Workshop" for Madhava Mathematics Competition 2025 Organized by Department of Maths & IT, B.C.S. Govt. P.G. College, Dhamtari (Chhattisgarh) funded by National Board of Higher Mathematics, Mumbai on January 09, 2025

This is certified that ——— took class for students Registered for the competition.

Dr Vinod Kumar Pathak
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Report On
Educational Tour
To

"NIT Raipur (C.G.), Energy Park Raipur (C.G.)
And
Regional Science Centre Raipur (C.G.)"

14 February 2025

Organized By

Department of Mathematics

(Session 2024-25)

ACKNOWLEDGMENT

We would like to express our sincere gratitude to all those who made our educational tour a success. Educational trips play a pivotal role in enhancing our cognitive skills and fostering a deeper interest in research. In today's context, theoretical knowledge alone is often insufficient, and practical experiences provide valuable insights that further enrich our learning.

First and foremost, we are grateful to the Principal of our college, Dr. Ajay Singh, for granting us permission to undertake this educational tour.
We also extend our heartfelt thanks to Dr. Padmavati, Head of the Department of Mathematics, for her unwavering support and prompt approval of this trip to the National Institute of Technology, Raipur. This visit broadened our understanding of various emerging research fields.

A special acknowledgment goes to Dr. Rakesh Tiwari, Professor, Department of Mathematics, for his coordination with the officials at NIT Raipur and for making all the necessary arrangements in a short time.

We would like to express our deep appreciation to the humble Vice Chancellor of NIT Raipur, who graciously provided us with the opportunity to visit the institute. We are also thankful to the teaching and non-teaching staff of the Department of Mathematics at NIT Raipur for their warm hospitality.

Our sincere thanks also go to Pratik Singh Sir and Deepak Dhirhe Ma'am, who accompanied us on this tour. Their care, patience, and guidance were integral to the success of the trip.

In addition to our visit to NIT Raipur, we also had the privilege of exploring the Science Centre Raipur and Energy Park. This trip has been an enriching and memorable experience for all of us.

We are truly grateful for all the support and experiences that made this educational tour possible.

Participants

S.N.	NAME OF STUDENT	GROUP
1.	AFFARA KHAN	GROUP A { L}
2.	DIVYA VERMA	GROUP A
3.	YAMINEE DEWANGAN	GROUP A
4.	RISHABH DADSENA	GROUP A
5.	HARSH NIRMALKAR	GROUP A
6.	NIKHIL	GROUP A
7.	SANSKAR TIWARI	GROUP B { L}
8.	ADITYA PANDEY	GROUP B
9.	SHOBHARANI	GROUP B
10.	TANNU VERMA	GROUP B
11.	DAMINI SAHU	GROUP B
12.	SANJANA	GROUP B
13.	MRIDUL NIRMAL	GROUP C { L}
14.	AJAY SAHU	GROUP C
15.	AAYUSHI MISHRA	GROUP C
16.	HEENA SAHU	GROUP C
17.	ANJANI	GROUP C
18.	AKANKSHA	GROUP C
19.	GAURAV PARATE	GROUP D { L}
20.	ANNUPAMA EKKA	GROUP D
21.	ABHIT	GROUP D
22.	NEHA NISHAD	GROUP D
23.	KHUSHBOO SAHU	GROUP D
24.	CHOVARAM	GROUP D
25.	MANISH SAHU	GROUP E { L}
26.	SEEMA BAGHEL	GROUP E
27.	KIRAN DEWANGAN	GROUP E
28.	RITA	GROUP E
29.	RUKHMANI MANDAVI	GROUP E
30.	NISHA SAHU	GROUP E

Educational Tour Report

Organized by: Department of Mathematics, Govt. V.Y.T. PG. Autonomous College

Date: 14 February 2025

Destinations:

1. **National Institute of Technology (NIT) Raipur, C.G.**
2. **Regional Science Centre Raipur, C.G.**
3. **Energy Park Raipur, C.G.**

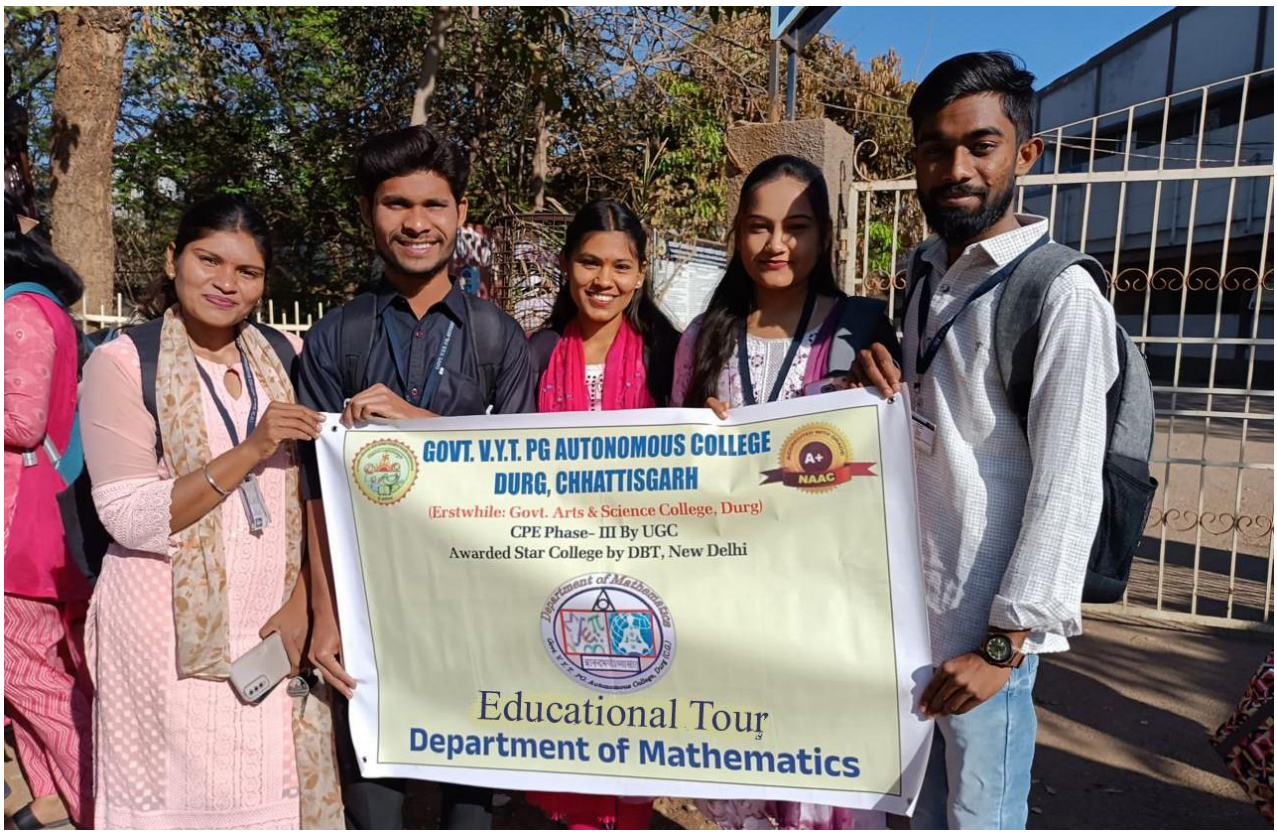
Participants: M.Sc. Fourth Sem. Mathematics Students (Session 2024-25)

Introduction

The Department of Mathematics, Govt. VYTPG Autonomous College, organized a one-day educational tour for M.Sc. fourth-semester students of the 2024-25 session. The primary objective was to foster a comfortable environment between students and faculty, enhancing their motivation towards academics and research. This tour aimed to provide students with exposure to research opportunities, scientific demonstrations, and group activities.

Objectives of the Tour

1. To create awareness about research opportunities after an M.Sc. in Mathematics.
2. To interact with professors and gain insights into academic and research career paths.
3. To observe and understand scientific models and theories through live demonstrations.
4. To engage in group activities that promote teamwork and collaboration.



Tour Itinerary

1. Visit to National Institute of Technology (NIT), Raipur

About NIT Raipur

National Institute of Technology (NIT) Raipur, formerly known as Government Engineering College (GEC) Raipur, is located in the capital city of Chhattisgarh, India. Over the years, the institute has carved out a distinguished identity in the field of technical education, contributing significantly to the development of high-quality human resources and knowledge in diverse areas of technology.

NIT Raipur was declared a "National Institute of Technology" by the Government of India on December 1, 2005, and later recognized as an "Institute of National Importance" in May 2007 under the National Institute of Technology Act 2007. With over six decades of rich history as a premier institution in technical education, NIT Raipur has built a legacy of academic excellence and innovation.

The institute offers a wide range of academic programs, including 12 undergraduate (UG) and 11 postgraduate (PG) programs. In addition to these, NIT Raipur also offers Ph.D. programs in 18 disciplines of science and technology, further emphasizing its commitment to fostering research and advancing knowledge across various fields.

About Mathematics Department

The Department of Mathematics at the National Institute of Technology (NIT), Raipur, was established in 1956, originally as part of the Government College of Engineering and Technology. Since its inception, the department has evolved into one of the most prominent and emerging departments within the institute.

The department is actively engaged in a wide array of research and teaching endeavors, covering various specialized fields of mathematics. These include Algebra, Linear Algebra, Optimization, Mathematical Ecology and Biology, Fluid Dynamics, Cryptography, and Statistics. Through these areas, the department contributes significantly to both theoretical advancements and practical applications of mathematics.

In addition to its academic excellence, the department provides a dynamic and supportive research environment, fostering innovation and collaboration among faculty, students, and researchers. This environment has proven to be conducive to the pursuit of knowledge and the development of cutting-edge research in mathematics.

The first destination was NIT Raipur, where students interacted with esteemed professors from the Mathematics Department. The discussion revolved around research opportunities, higher education prospects, and career pathways in mathematics. Professors shared their experiences, providing a roadmap for students to pursue research and development in their field. The session was insightful and encouraged students to explore academic excellence beyond their coursework.

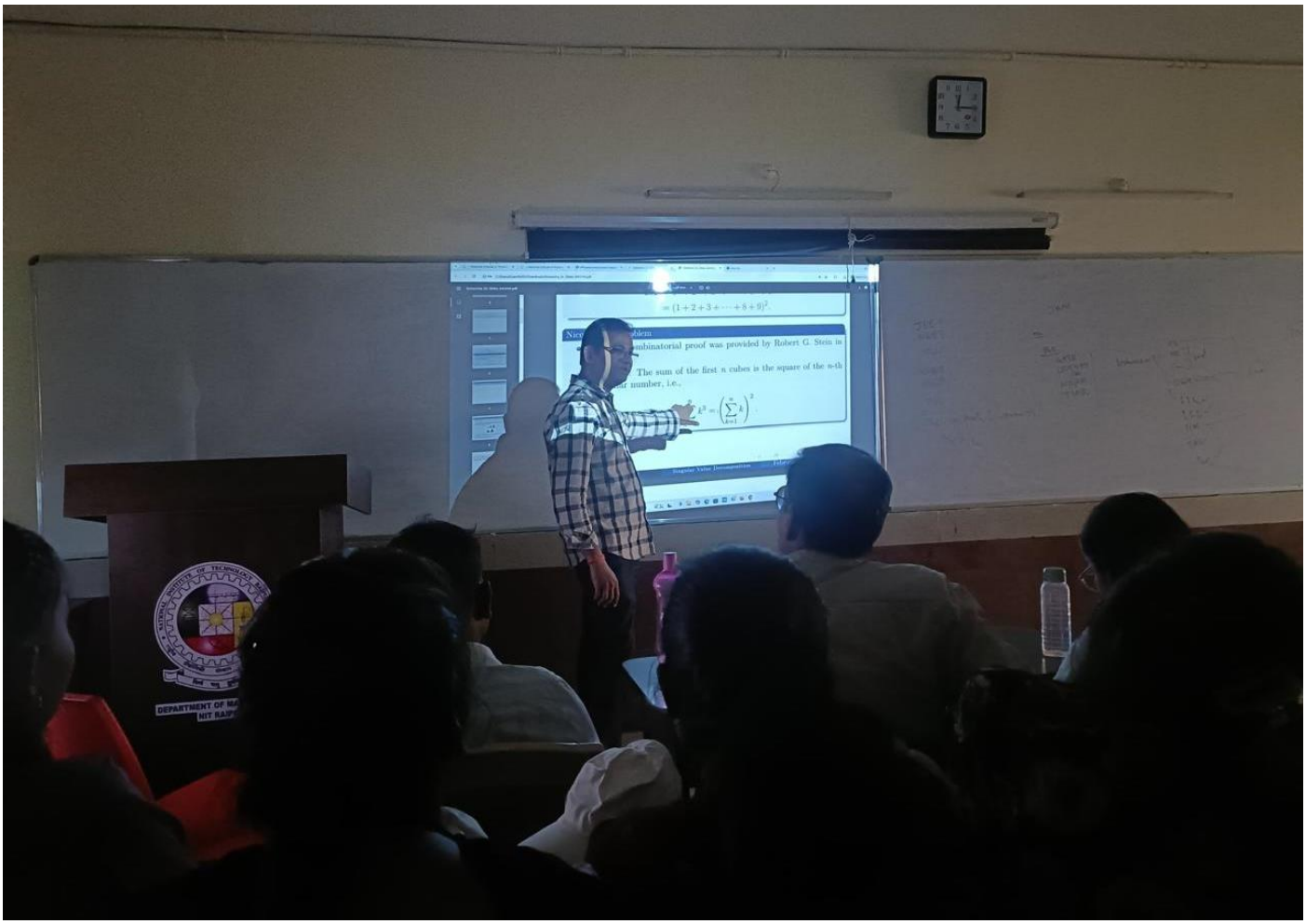
NIT RAIPUR

Interaction with Research Scholars at NIT Raipur

Introductory Speech by Dr. Nilesh Kumar Thakur, Associate Professor, NIT Raipur

Speech by Dr. Rakesh Tiwari at NIT Raipur


JAM
JEE
NEET
NLU
MSc
PhD
GATE
CSIR NET
NBHM
TIFR
Interview
IITs
Unis
IISER/NIS
IISc
ISI
IIM
TIFR



Faculty of NIT Raipur:

- Dr. Arvind Kumar Sinha
- Dr. Deepmala Sharma
- Dr. R.K. Das
- Dr. S.N. Raw
- Dr. D. Mishra
- Dr. N.K. Thakur

Faculty of Govt. V.Y.T. PG. Auto. College, Durg:

Dr. Rakesh Tiwari, Asstt. Prof.
Ms Deepak Dhihre, Guest Lecturer
Mr. Pratik Singh Thakur, Research Scholar

2. Visit to Regional Science Centre, Raipur

The Chhatisgarh Regional Science Centre, Raipur

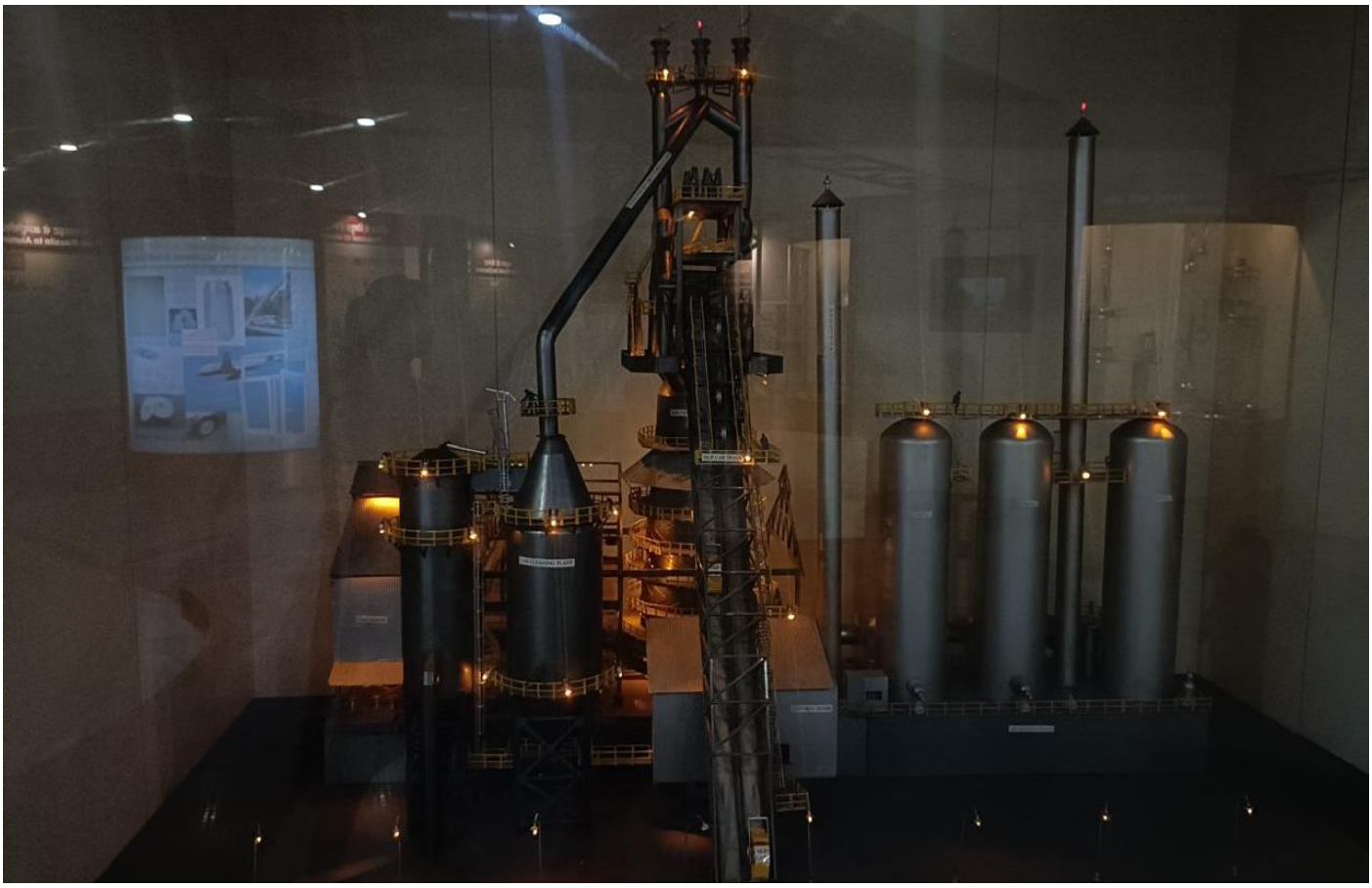
The Chhattisgarh Regional Science Centre (CRSC), under the Department of Science & Technology, Government of Chhattisgarh, is the first Science Museum of the state. It was established on July 13, 2012, with the collaboration of the Department of Science & Technology, Government of Chhattisgarh, and the National Council of Science Museums, Kolkata.

The primary mission of CRSC is to popularize and promote science, especially among the youth, throughout the year. The centre achieves this goal through various interactive models, educational programs, and engaging activities. The exhibits and facilities at CRSC are carefully designed to enhance the knowledge base of students and visitors, focusing not only on fundamental subjects such as physics, geology, and forestry, but also on current topics in science and technology, along with important social issues.

Through its innovative approach, the Chhattisgarh Regional Science Centre aims to inspire curiosity, foster critical thinking, and spark a deeper interest in scientific exploration among the youth, thus contributing to the overall development of scientific knowledge and awareness in the region.

Following the visit to NIT Raipur, students proceeded to the Regional Science Centre. Here, they observed various working models that demonstrated fundamental and advanced scientific theories. These models provided practical insights into mathematical and physical concepts, making abstract ideas more tangible and easier to comprehend. This interactive session reinforced theoretical knowledge through real-world applications.

Regional Science Centre Raipur



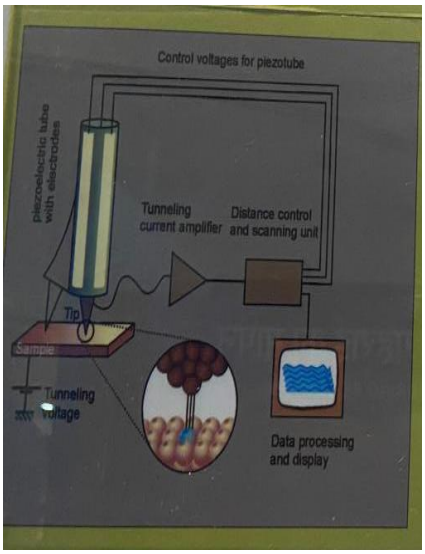
Modern Furnace

Scanning Tunnelling Microscope (STM)

The Scanning Tunnelling Microscope (STM) is a powerful technique used to visualize and study surfaces at the atomic level. The STM operates by utilizing a sharp conductive tip (stylus) that scans the surface at a fixed distance from it. When the stylus is brought very close to the surface, a bias voltage applied between the surface and the tip allows electrons to tunnel through the vacuum between them. This phenomenon, known as quantum tunnelling, occurs because of the wave-like properties of electrons, which allow them to pass through barriers that would be insurmountable in classical physics.

The tunnelling current generated by the flow of electrons is measured and recorded, providing valuable information about the surface's atomic structure. The data gathered from the tunnelling current is used to construct a three-dimensional profile of the surface, revealing the arrangement of atoms and features at a nanoscale level. From this profile, a computer-generated contour map of the surface is produced, allowing researchers to study the surface in great detail.

STM has proven to be an invaluable tool in fields such as material science, nanotechnology, and surface chemistry, providing insights into the structure and behavior of materials at the atomic scale.



Taramandal Show

Farming

Team Activity

Team A

Team B

Team C

Team D

Team E

3. Visit to Energy Park, Raipur

The final stop was Energy Park, where students participated in group activities aimed at fostering teamwork and collaboration. The park provided a relaxing yet engaging environment, allowing students to interact with their peers and faculty members in an informal setting. This helped in strengthening their trust towards the department and enhancing their enthusiasm for academic pursuits.

Energy Park

Conclusion

The educational tour was highly beneficial for the students. It not only provided exposure to academic and research opportunities but also created an engaging learning environment beyond the classroom. The interactions with professors and hands-on experiences at the science centre helped in renewing their interest in mathematics. Additionally, group activities at Energy Park strengthened peer relationships and faculty-student bonds.

Overall, the tour successfully achieved its objective of motivating students towards their curriculum and research aspirations, making it a fruitful and memorable experience for all participants.

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Awarded Star College By DBT, New Delhi

DEPARTMENT OF MATHEMATICS

SESSION: 2024-25

A Brief Report On :

EDUCATIONAL TOUR

TO

BHUBANESHWAR AND JAGANNATH PURI, ODISHA

24th To 28th March, 2025

ACKNOWLEDGEMENT

We, the students and faculty members of Govt. V.Y.T PG Autonomous College, Durg, would like to express our sincere gratitude to our esteemed Principal **Dr. A.K. Singh**, for providing us with the opportunity to embark on an educational tour to "Bhubaneswar and Jagannath Puri".

We also thankful to **Dr. Padmavati Sudha, HOD** a great personality who is the inspirer and motivater behind this tour and the extreme supportive professors of Mathematics Department Govt. V.Y.T PG Autonomous College, Durg (C.G).

We would like to extend our heartfelt thanks to **Dr. Prachi Singh** and **Ambalika Chauhan** the organisers of the tour for guiding us throughout the tour. Their meticulous planning, expertise, and dedication ensured a seamless and enlightening experience for all of us.

The tour was an incredible blend of education, culture, and spirituality. We gained valuable insights into the rich history, architecture, and heritage of Odisha, and had the privilege of visiting iconic landmarks such as the Jagannath Temple and the Konark Sun Temple.

This tour has not only broadened our knowledge but also fostered a sense of camaraderie and teamwork among us. We are grateful for this opportunity and look forward to applying the lessons learned during this tour in our future endeavors.

Thank you once again, Dr. A.K. Singh, Dr. Prachi Singh, and Ambalika Chauhan & Mathematics Department, for creating lifelong memories and enriching our educational experience.

OBJECTIVE

The main objective of the educational tour is to explore and discover the mathematical aspects inherent in the architectural, cultural, and natural heritage of Bhubaneswar and Jagannath Puri, fostering a deeper understanding of the interconnectedness of mathematics and real-world phenomena, by which we observe and notice such hidden mathematical perspective that enhance our imagination about any object and places.

It is a well know fact that the things which we learn directly by exploring are more effective than our daily classroom study. That is why this kind of educational visit help us to learn much more.

There are some strange mathematical model which are not easy to explore are explained by Professors.

Tour Iterenery:

25/03/25 - First visit to Govardhan Math Shankaracharya Aasharam & Jagannath Temple Puri.

26/03/25 – Visit to Regional Science Center, Lingaraj Temple, Dhavalgiri Bauddh Temple (Bhubaneswar)

27/03/25 – Second Visit to Govardhan Math Shankaracharya Aasharam & Konark Sun Temple.

Day 1 (25/03/25)

Govardhan Math & Jagannath Temple Puri

The day we reached puri the people of Chhattisgarh celebrate **Bhakt Karma Mata Jayanti** as we all know the story related to her and lord Krishna and the people of ORRISA also celebrate this festival and we were being the part of that festival, and also came to know about the rituals that the people of ORRISA perform.

Govardhan Math Shankaracharya Aasharam:

First day we visit to Govardhan Math Shankaracharya Aasharam which is the Purvamnaya Sri Govardhana Pitham or Govardhan Math is one amongst the four cardinal pithams established by the philosopher-saint Adi Shankara in the 9th century AD, to preserve and propagate Hinduism and Advaita Vedanta, the doctrine of non-dualism. Located in Puri in Odisha, India. Which was currently handle by the 145th Shankaracharya Swami Nishchalanand Saraswati ji , He was a great mathematician and the

wonderful personality he was one of the four Shankaracharya of the four directions.

we visit the campus of the math and volunteer some work which enhances our teamwork ability and social activity, after that we visit Jagannath Puri Temple where we come to know about the various amazing facts about the temple which defies the logic of science and forced to believe that their something more other than science, just like the

Temple flag : The at the top of the temple strangely always float in the opposite direction of the wind. The flag floating in opposite direction brings your scientific reasoning to a halt and you just tend to believe that there is some force more powerful than science.

While the spiritual interpretation holds profound significance for devotees, several scientific theories have been proposed to explain this phenomenon:

Aerodynamics of the Temple Structure: The unique architecture of the temple, particularly its domed spire, may influence wind flow around it. The blunt shape of the temple's towers can cause the wind to move upward and around them, creating eddies that might cause the flag to flutter in unexpected directions.

Kármán Vortex Effect: This phenomenon occurs when wind flows past a large, blunt object, creating swirling vertices. These vertices can alter the local wind direction near the object, potentially causing the flag to flutter against the prevailing wind direction.

The temple is renowned for several other phenomena that intrigue visitors:

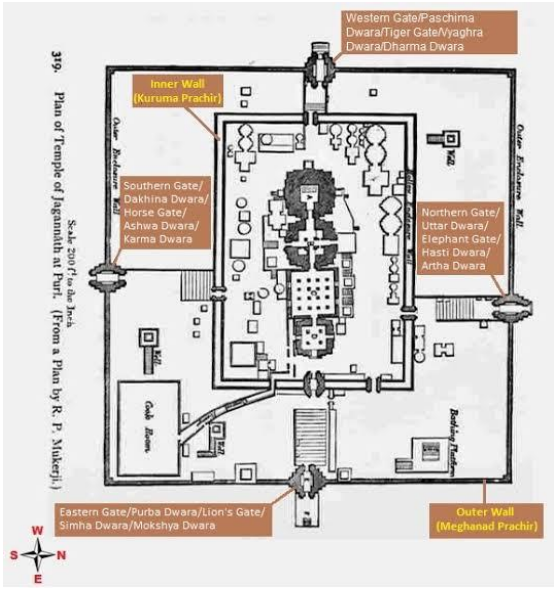
- No Shadow at Noon
- Bird free zone
- The Sudarshan Chakra Visibility : The chakra is actually 20 feet high and weight a ton. It is fitted on a top of the temple, but what is interesting about the chakra is that you can see this chakra from any corner of the Puri City. The engineering mystery behind the placing and positioning of chakra is still a mystery because irrespective of your position and you can always feel that the chakra is facing towards you.

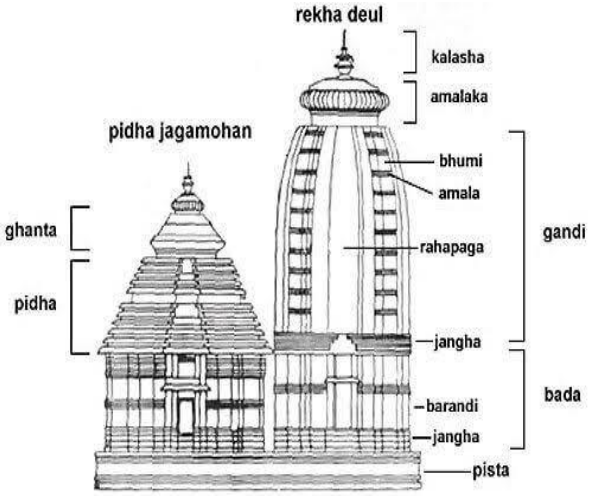
The Jagannath Temple in Puri showcases Kalinga-style architecture, incorporating mathematical principles like the use of squares, circles, and concentric layering, and a height of 214 feet (65 meters).

Key Architectural Features and Mathematical Elements:

<u>Kalinga Style Architecture:</u>

The temple exemplifies the Kalinga style of architecture, which is a regional variant of





the broader Nagara style, known for its curvilinear towers and intricate carvings.

Vimana (Tower):

The main temple, or Vimana, rises from a square plinth and features a sheer perpendicular section before curving inward, reaching a height of 192 feet (58 meters).

Temple Complex Dimensions:

The temple complex is enclosed by two rectangular walls, with the outer enclosure (Meghnad Prachira) measuring approximately 200 meters (665 feet) by 192 meters (640 feet).

Square and Circle Themes:

The temple's design incorporates geometric principles like squares and circles, with the main temple structure consisting of a sanctum sanctorum (garbhagriha), a porch (mandapa), and a towering spire (shikhara).

Concentric Layering:

The temple features a concentric layering design, where structures rise symmetrically above the central core.

Temple Height: The temple is 65 meters (214 feet) high.

Axial Alignment:

The four main structures (Vimana, Jagamohana, Nata-mandapa, and Bhogamandapa) are built in axial alignment in an east-west direction.

Mandala:

The geometry of the temple plan starts with a line, forming an angle, evolving a triangle, then a square and distinctively a circle and so on, ultimately deriving complex forms.

By concluding the experience of Jagannath Puri Temple was amazing, spritual and divine, literally by visiting that place we came to know about when mathematics fits with the situation the rest will ultimately gonna be fine.

Day 2 (26/03/25)

Regional Science Center, Lingaraj Temple and Dhavalgiri Temple

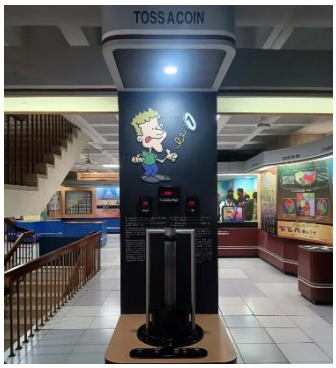
Regional Science Center, Bhubaneswar:

Regional science centre, Bhubaneswar was our key destination here there are several zones to learn specific thing such as 3D show,dinosaur park where we can learn or grab knowledge in attractive way there is science zone where there is too many models related to physics, space, chemistry and mathematics etc.

Our main focus of learning is towards mathematical models history and its application the analysis of models and chart with the help to image in the next part of our report,

Here we come to know about various aspects of mathematics which we learn theoretically but here we know it practically as well,

Toss a Coin:



We all know about the probability of tossing a coin but here we experiencd it practically here or machine name toss a coin where we press the toss switch to toss a coin observe the result of the toss. Enter the result by pressing the appropriate switch HEAD or TAIL repeat that experiment several times the display will tell you the number of head and tail secured by you and also the cumulative total.

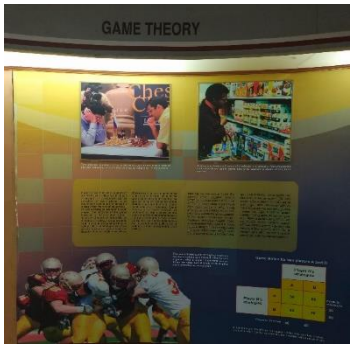
When you toss the coin there was two possibilities outcomes it can be head or a tail both which are equally probable that means the probability of winning on a head or a tale is equal this can be verify if cos for a large number of time.

Pythagoras theorem :

Rotate the circular discs so that the liquid from the bigger container is poured into the two smaller ones. Reverse the experiment to put the liquid back into the Bigger ones. Observe that liquid exactly fills up the space in each case, indicating that the volumes are same.

The thickness the containers being same, the area of that figure under the bigger container is equal to the sum of the other two areas. As the figures are constructed over the three sides of a right angled triangles, the square of the longest side(hypotenuse) is equal to the sum of squares

of the other two sides (base and perpendicularly). This interesting property of a right angled triangle was discovered by the Greek mathematician pythagoras in 6^{th} century BC.



Game Theory:

Game theory was developed for decision making under conflicting situations where there are one or more opponents (players). The games like chess , poker ,etc. have the characteristics of competition and are

played according to some definition rules .Game theory provides optimal solutions to such games, assuming that each of the players wants to maximize his profit or minimize his loss.

John von Neumann, whom people called Johnny, was a brilliant mathematician and physicist who also made three fundamental contributions to Economics. The first is a 1928 paper written in German that established von Neumann as the father of game theory.

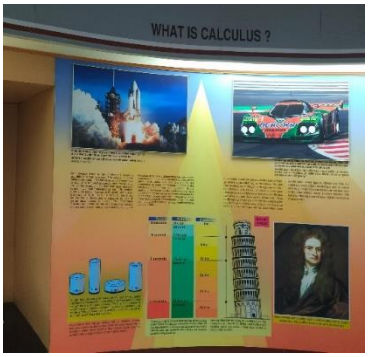
Game theory has applications in a variety of areas including business and economics. In 1994, the Nobel Prize Economics science was won by John F. Nash, Jr. John C. Harsanyi, and Reinhard Selton for their analysis of equilibria in the theory of non co-operative games. Later in 2005, Robert J. Aumann and Thomash C. Schelling won the Nobel Prize for Economics Science for enhancing our understanding of conflict and cooperation through game theory analysis.

Elliptical Carrom Board:

We have seen many square shaped carrom board in our life but the elliptical carrom board as per name it is elliptical in shape is very interesting to play and a special carrom board. firstly we know about the Ellipse is like a circle but it has 2 centre known as foci or Ellipse have a special property that if we calculate the total distance between this two foci from any point on Ellipse then all the distance will be equal.

How this board works: We will put the carrom coin and the striker in both of foci of ellipse we hit striker the striker from any point either from anywhere the striker is going to hit this carrom coin. This is accordance with the law of reflection, the striker always passing to another foci of that ellipse. This experiment was explained by our PhD. schloar **Mr. Pratik Singh Thakur.**

Calculus :

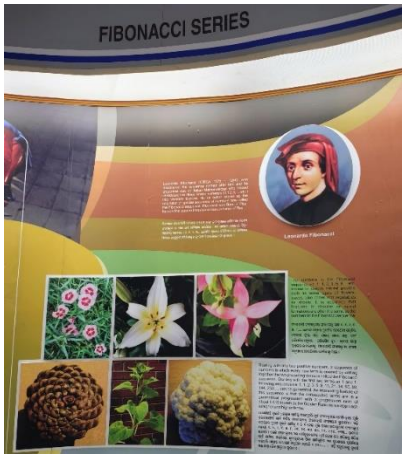


In the 17th century, “Isaac Newton” and “Gottfried Wilhelm Leibniz” independently developed calculus into a complete mathematical system. Newton used calculus to study the motion of objects, while Leibniz developed the notation and formalism that are still used today.

Over time, calculus has evolved and been refined by many mathematicians, including “Leonhard Euler”, “Joseph-Louis Lagrange”, and “Augustin-Louis Cauchy”. Today, calculus is a fundamental tool in mathematics, physics, engineering, and economics, and its impact on our understanding of the world is immeasurable.For example (i)

Scientists use calculus to calculate the escape velocity and the rocket's velocity and position at any given time.

Fibonacci Series:



The Fibonacci Series: Unlocking the Secrets of Nature's Code

The Fibonacci series, a sequence of numbers in which each number is the sum of the two preceding numbers (1, 1, 2, 3, 5, 8, 13, …), has been a subject of fascination for mathematicians, scientists, and philosophers for centuries. This deceptively simple sequence has been found to be a fundamental principle underlying many natural phenomena, from the arrangement of leaves on a stem to the structure of DNA.

History of the Fibonacci Series

The Fibonacci series is named after the Italian mathematician Leonardo Fibonacci, who introduced it in the 13th century as a solution to a problem involving the growth of a population of rabbits. However, the sequence was known to Indian mathematicians as early as the 6th century.

Properties of the Fibonacci Series

The Fibonacci series has several unique properties that make it a fundamental principle of nature:

1. **Recursion:** Each number in the sequence is the sum of the two preceding numbers.

2. **Asymptotic behavior:** The ratio of any two adjacent numbers in the sequence approaches the golden ratio (approximately 1.618) as the sequence progresses.

3. **Universality:** The Fibonacci sequence appears in many natural phenomena, from the arrangement of leaves on a stem to the structure of DNA.

Appearance in Nature

The Fibonacci series appears in many natural phenomena, including:

1. **Leaf arrangement:** The arrangement of leaves on a stem follows a Fibonacci sequence, allowing for maximum exposure to sunlight and space efficiency.

2. **Flower petals:** The number of petals in a flower often follows a Fibonacci sequence (e.g., 3, 5, 8, 13).

3. **Branching trees:** The branching patterns of trees often follow a Fibonacci sequence, allowing for maximum structural efficiency.

4. **DNA structure:** The structure of DNA follows a Fibonacci sequence, with the sugar-phosphate backbone forming a double helix with a Fibonacci-like structure.

Applications in Art and Architecture

The Fibonacci series has been used in art and architecture to create visually pleasing and balanced compositions. Examples include:

1. **Leonardo da Vinci's Vitruvian Man:** The famous drawing depicts a nude male figure inscribed within a circle and square, with the proportions of the figure following a Fibonacci sequence.

2. **Greek architecture**: The Parthenon in Athens, Greece, is designed using Fibonacci proportions, creating a sense of balance and harmony.

The Fibonacci series is a fundamental principle of nature, appearing in many natural phenomena and underlying many artistic and architectural compositions. Its unique properties, such as recursion and asymptotic behavior, make it a fascinating subject of study, with applications in fields ranging from biology to architecture.

Topology:

Topology: Unlocking the Secrets of Shapes and Spaces

Topology, a branch of mathematics, is the study of the properties of shapes and spaces that are preserved under continuous transformations, such as stretching, bending, and twisting. This field of mathematics has far-reaching implications in various disciplines, from physics and engineering to computer science and biology.

What is Topology?

Topology is concerned with the study of topological spaces, which are sets of points that are connected in some way. The key concept in topology is the idea of continuity, which allows us to deform shapes without tearing or gluing them. This means that topological properties, such as connectedness and holes, remain unchanged under continuous transformations.

Types of Topology

There are several types of topology, including:

1. **Point-Set Topology:** This is the most basic type of topology, which deals with the study of topological spaces in terms of their points and open sets.

2. **Algebraic Topology:** This type of topology uses algebraic tools, such as groups and rings, to study topological spaces.

3. **Differential Topology:** This type of topology studies the properties of smooth manifolds, which are topological spaces that are smooth and continuous.

Topology has numerous applications in various fields, including:

1. **Physics:** Topology plays a crucial role in the study of the behavior of particles and forces in physics. For example, the concept of topological insulators has led to the discovery of new materials with unique properties.

2. **Computer Science:** Topology is used in computer science to study the properties of networks and algorithms. For example, the concept of topological sorting is used to order the nodes of a network in a way that respects their dependencies.

3. **Biology:** Topology is used in biology to study the structure and behavior of molecules, such as proteins and DNA. For example, the concept of topological entropy is used to study the complexity of biological systems.

Real-World Examples of Topology

1. **The Mobius Strip:** A Mobius strip is a two-dimensional surface with a single side. It is a classic example of a topological space, and it has numerous applications in physics and engineering.

2. **The Klein Bottle:** A Klein bottle is a two-dimensional surface that is curved in such a way that it has only one side. It is another example of a topological space, and it has applications in physics and computer science.

3. **The Torus:** A torus is a doughnut-shaped surface that is a classic example of a topological space. It has numerous applications in physics and engineering, including the study of magnetic fields and electrical circuits.

Topology is a fascinating field of mathematics that has far-reaching implications in various disciplines. From the study of the behavior of particles and forces in physics to the study of the structure and behavior of molecules in biology, topology plays a crucial role. Its applications in computer science, engineering, and other fields make it a fundamental tool for understanding the world around us.

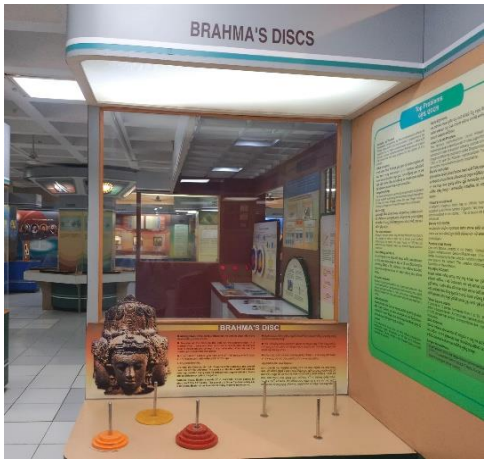
Some more intresting things which we explore there:

Mirror illusion

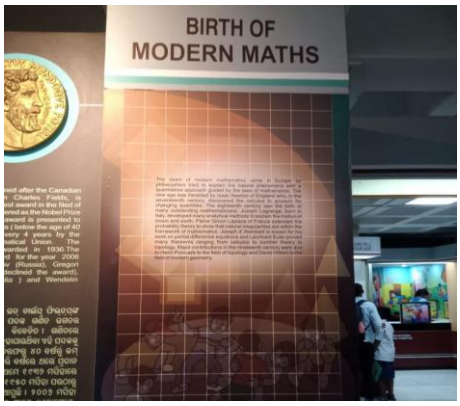
Greek History of Geometry

Math behind any growth

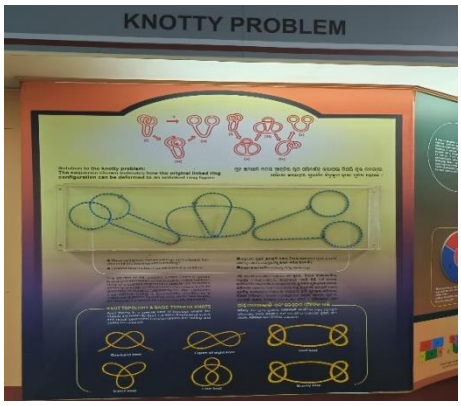
Pillars of History



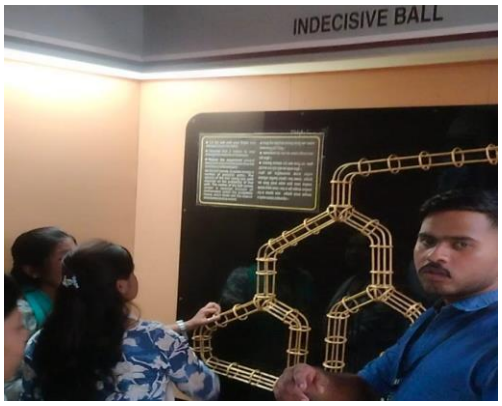
Brahma's Disc



History of Modern Maths



Knotty Problem



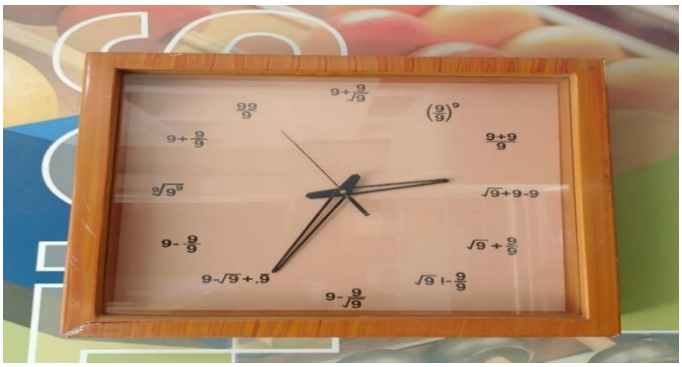
Indecisive Ball

Dr. Prachi Singh explaining about Epicycloid

Pascal's Triangle

Pin Screen

Oscillation Model



Mathematical Clock

Lingaraj Temple, Bhubaneswar:

After the visit of Regional Science Center we heading towards **Lingaraj Temple** which is a magnificent shrine dedicated to lord Shiva, showcasing exceptional **Kalinga architecture**. This 11th-century temple is a testament to ancient Indian craftsmanship, with a towering **vimana** (sanctum) that rises 55 meters (180 feet) and over 150 smaller shrines adorned with intricate carvings.

History of the Temple

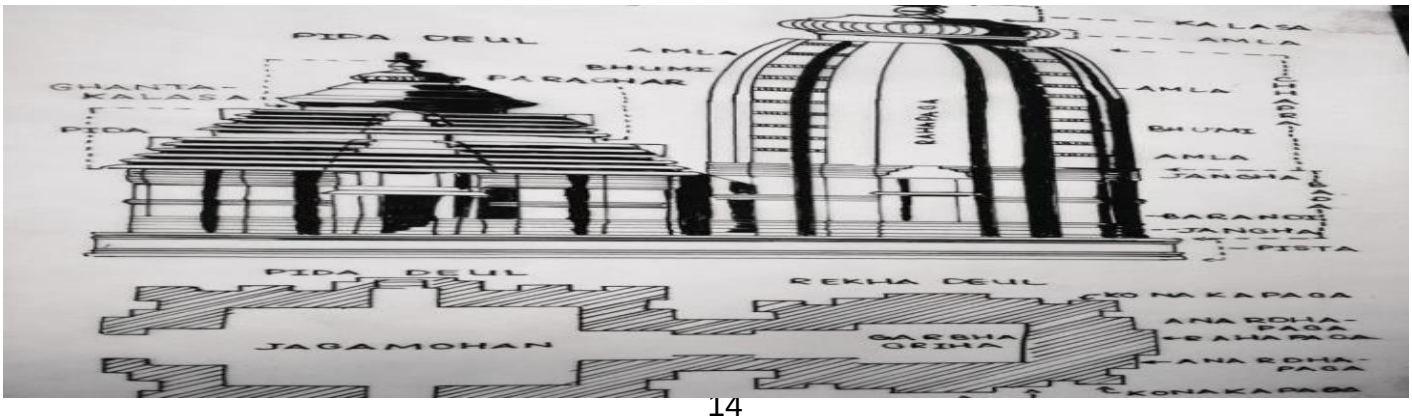
The Lingaraj Temple's origins date back to the 7th century AD, with the existing structure

constructed during the 11th century AD under King Jajati Keshari of the Somavamsi dynasty. The temple's history is a blend of Shaivism and Vaishnavism, reflecting the peaceful coexistence of these two ancient Indian traditions.

The Shrine

The temple complex is enclosed by a massive boundary wall measuring 520 feet by 465 feet, with a thickness of 7.5 feet. The shrine itself is built using sandstone and laterite, typical of the region's ancient architectural traditions. The grand entrance gate is made of sandalwood, enhancing the temple's aesthetic appeal.

Key Features –



Vimana (Garbhagriha): The sanctum sanctorum where Lord Shiva is enshrined, rising to a height of 55 meters.

- **Jagamohana:** The assembly hall for devotees, slightly shorter but equally ornate.

- **Nata Mandira:** The festival hall for cultural rituals and dance performances.

- **Bhoga Mandapa:** The hall for offerings, contributing to the overall design and significance.

Significance and Festivals

The Lingaraj Temple is a major spiritual landmark in India, dedicated to Lord Shiva as Harihara, a fusion of Shiva and Vishnu. The temple is home to the Svayambhu Linga, a self-manifested Shiva idol believed to grant moksha (spiritual liberation). Major festivals celebrated here include [1] [2]:

- **Maha Shivaratri:** A significant festival honoring Lord Shiva.

- **Ashokashtami:** A festival where the deity is taken in a chariot to Rameshwar Deula temple.

At last we end up our secondary trip by visiting **Dhauligiri Shanti Stupa.**

Dhauligiri Hills is a place marked with the serenity of Daya River and lies at a distance of 8 Km from Bhubaneswar. The famous rock edicts of Ashoka are worth witnessing. Moreover, it is in Dhauli Hills that adopted the path of dharma which lets only peace and love enter your lives. The concept of dharma- vijay became his ultimate goal as he took Buddhist teachings deep into his heart.

The end of the bloody battles was only to serve and favor mankind. With this, the religious and spiritual beliefs of Buddhism spread to different parts of the world. Dhauli Hills in Bhubaneswar takes you to the site of the Vishwa Shanti Stupa. The dome structure of the Shanti

Stupa possesses five umbrellas and they symbolize the five essential parts of Buddhism.

It was a very soothing experience, which makes our mind calm, gentle, and stress free after the hectic schedule and long way travel. The place was very clean and the fresh air makes us feel fresh and charged.

Dhauligiri Shanti Stupa:

Shanti Stupa of Dhauligiri is also known as the **Peace Pagda.**

Day 3 (27/03/25)

Second Visit to Govardhan Math Shankaracharya Aasharam & Sun Temple Konark

Group Activity

Govardhan Math Shankaracharya Aasharam:

We started our third or final day with volunteering swachh parisar abhiyan at **Govardhan Math Shankaracharya Aasharam, Puri.** Each of us indulge in cleaning the campus of math and some of our group members helping in the kitchen of that math, some of them filling surahis and buckets of water for the birds and monkeys, it was a very wonderful experience for all of us for being part of this activity, this activity foster our teamwork ability and enhance coordination between us. All these activities are under the surveillance of our Professor **Dr. Prachi Singh** she guide us in every step, the boys team was lead by PhD. Scholar Mr. Pratik Singh Thakur and the girls team was lead by Guest lecturer Miss Ambalika Chauhan & PhD. Scholar Miss Iti Sao, after all these activity we are blessed to get a session Of **Hrishikesh Brahmachari Ji**, disciple of Puri Shankaracharya Ji Maharaj, he



taught us about the divinity of that place and

- **Shakti Peeth:** Govardhan Math Puri is considered one of the 51 Shakti Peeths, sacred sites dedicated to the goddess Shakti.

- **Goddess Sati:** According to legend, the navel of Goddess Sati fell at this site, making it a revered location for devotees.

- **Temple and Deity:** The temple is dedicated to Goddess Sati, who is worshipped as the embodiment of feminine energy.

- **Pilgrimage and Rituals:** Devotees visit Govardhan Math Puri to seek blessings and perform rituals, believing that the goddess grants wishes and provides spiritual growth.

- **History:** The temple has a rich history, with its origins dating back to ancient times.

- **Architecture:** The temple's architecture reflects the traditional Odia style, with intricate carvings and sculptures.

These facts provide a glimpse into the significance and cultural importance of Govardhan Math Puri as a Shakti Peeth.

There we also get to know about the contribution of the Govardhan Math Puri, particularly through the work of Jagadguru Shankaracharya Bharati Krishna Tirthaji Maharaj, in the rediscovery and popularization of ancient Indian mathematics, now known as **Vedic Mathematics**, which he compiled into a book published in 1965.

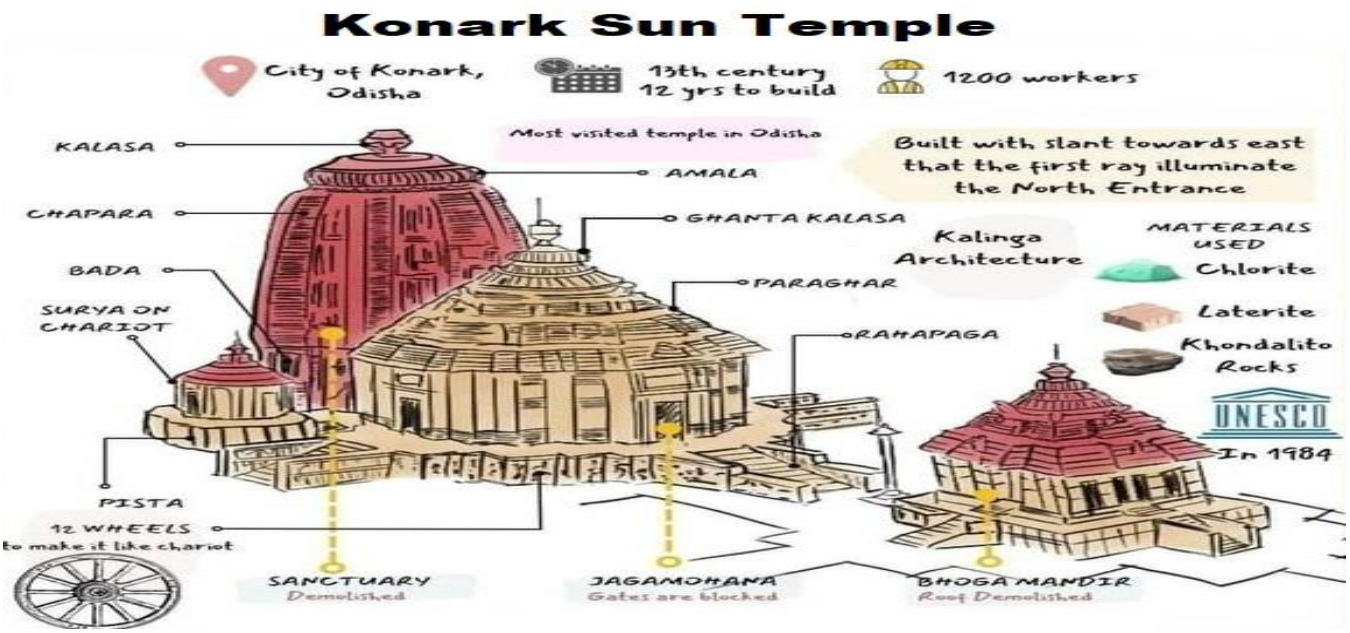
Sun Temple Konark:

Following our iterenery our next destination was **Sun Temple, Konark.** The name "Konark" is derived from two words: "Kona" and "Arka". In Sanskrit, "Kona" means "corner" or "angle", and "Arka" means "sun". Therefore, the name Konark can be literally translated to "the sun in the corner" or "the sun at the angle".

In the context of the Sun Temple in Konark, Odisha, the name refers to the temple's location in a corner of the region and its dedication to the sun god, Surya. The temple is designed in the shape of a giant chariot, with intricate carvings and sculptures, and is considered one of the most magnificent examples of ancient Indian architecture. The existence of sun temple is cited in many of the religious text and puranas. Ine purana the place is mentioned as Munira or Mundirasvam in which was later replaced by the name Konark.

The Konark Sun Temple , is a masterpiece of ancient architecture that incorporates the golden ratio in its design. The temple's layout and plan showcase the golden ratio's influence in its proportions, particularly in the dimensions of the Jaganmohana (assembly hall). The golden ratio, approximately 1.618, is a mathematical concept used to create aesthetically pleasing designs.

The Golden Ratio:



- **Jaganmohana Proportions:** The dimensions of the assembly hall closely match the golden ratio, contributing to the overall balance and harmony of the structure.

- **Sculptures and Artistic Features:** The temple's intricate carvings and sculptures are crafted with a keen eye on proportion and balance, reflecting the golden ratio's influence.

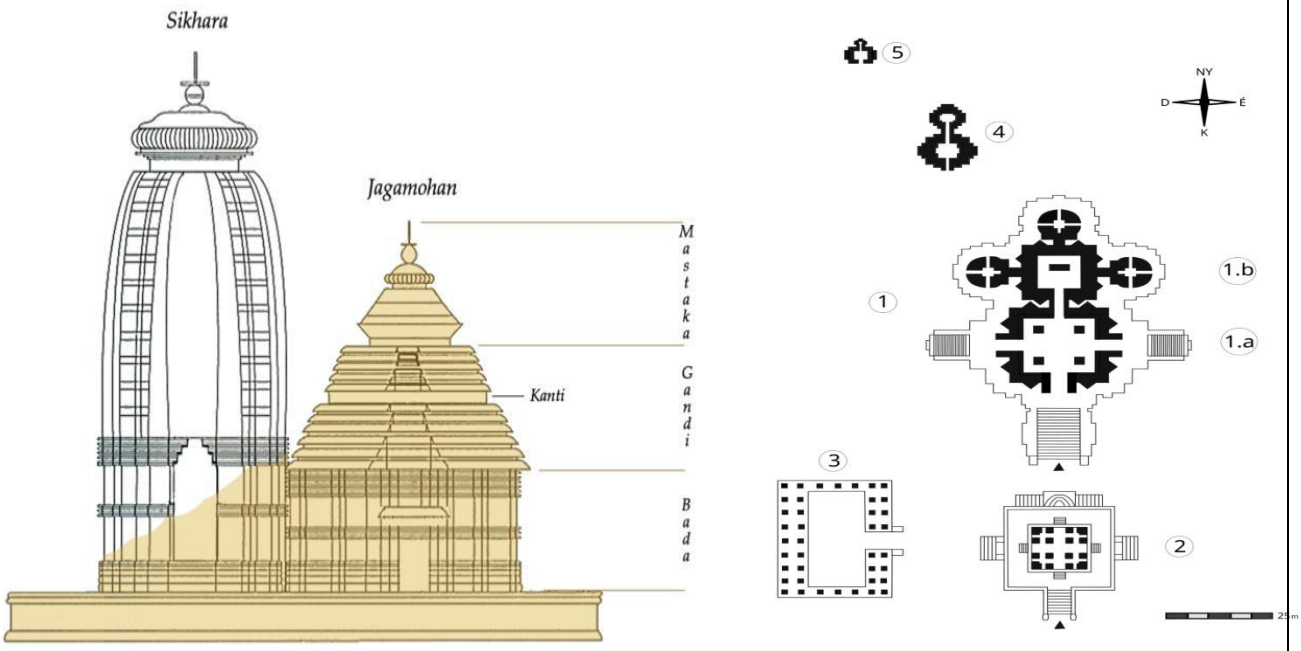
- **Architectural Design:** The temple's design, including the placement of elements like windows, columns, and decorative elements, adheres to the principles of the golden ratio.

The use of the golden ratio in the Konark Sun Temple's design creates a sense of visual harmony and balance, making it a timeless example of architectural brilliance.

The Konark Sun Temple has a meticulously planned structure such that the first ray of the morning sunn fall directly on the statue of the Surya Deva kept in the garbhgriha. The Konark Sun Temple is not situated parallel to the East axis but slightly deviated with such a precise slant that the first ray of the morning Sun fall on the main entrance. The garbhgriha was positioned in such a way so as to receive direct sun ray on a particular day and at a precisely determined angle based on astronomical computations this was determined by three factors:

1. The angular position of the earth rotating around the sun is depend upon the oval orbit.
2. Angular position of the between 22.1 and 24.5 degree (a phenomena called precession) measured by Milankovich cycle.
3. The quantum of radiation which enters depend upon solar activity (flares) cycles emanating carbon in a 2000 year cycle.

Geometry:



<u>The wheel of the Temple chariot:</u>

The construction of this temple is a masterpiece of Orissa's medieval architecture one of the main attraction of this temple is the 24 wheels which are carved around the base of the temple. Each wheel is about 10 ft. in diameter with a set of spokes and elaborate cravings. This wheels are located in both North and South side of the temple here we can see that 8 wider spokes i.e.

8 wider spokes = 3600

1 wider spoke = 3600/8

1 wider spoke = 45º (angle between two wider spoke)

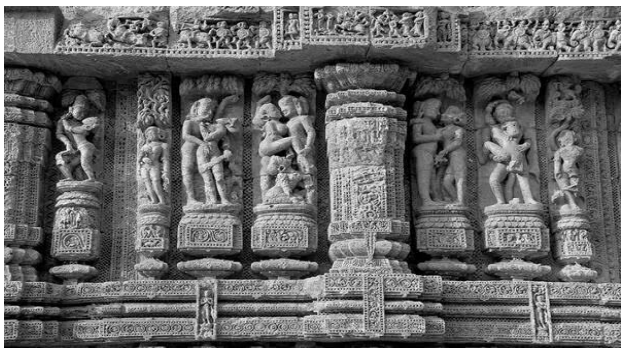
30 beads between wider spoke and thinner spoke which is equal to 1.5 hr (i.e. 7:30 Am. To 9:00 Am.)

Then **30 beads = 90 min → 1 bead = 3 min**

Carvings on the wall of Konark temple:

The carvings on the walls of the Sun Temple in Konark are a testament to the artistic and cultural heritage of ancient India. These intricate carvings depict various aspects of life, mythology, and culture, showcasing the craftsmanship and creativity of the artisans who built the temple.

Some of the notable carvings include:



Erotic sculptures

Mythological sculptures

Hindu Deities sculptures

- Scenes from everyday life: The carvings depict scenes from everyday life, such as farmers working in the fields, musicians playing instruments, and dancers performing.

- Mythological scenes: The carvings also depict scenes from Hindu mythology, such as the stories of the gods and goddesses, and the epic tales of the Ramayana and the Mahabharata.

- Erotic sculptures: The temple is also famous for its erotic sculptures, which depict various aspects of human relationships and intimacy.

- Floral and geometric patterns: The carvings also include intricate floral and geometric patterns, which add to the overall beauty and grandeur of the temple.

The carvings on the walls of the Sun Temple in Konark are a reflection of the cultural and artistic heritage of ancient India, and they continue to inspire and fascinate visitors from around the world.

The Twelve Spokes: Symbolism of the Hindu CalendarKonark Sun Temple Time Wheel each of the 12 spokes of the Konark wheel has specific symbolism, representing the 12 months of the Hindu lunar calendar. The placement of these spokes reflects the cyclical nature of time and the Sun God's journey across the sky throughout the year.

Spoke	**Month**	**Seasonal Significance**
1st Spoke	Chaitra (March-April)	Spring, New Beginnings
2nd Spoke	Vaishakha (April-May)	Summer, Heat & Energy
3rd Spoke	Jyeshtha (May-June)	Early Summer, Blooming
4th Spoke	Ashadha (June-July)	Monsoon, Growth of Crops
5th Spoke	Shravan (July-August)	Monsoon, Fertility
6th Spoke	Bhadrapada (August)	Harvest, Abundance
7th Spoke	Ashvin (September)	Autumn, Cooling of Earth
8th Spoke	Kartika (October)	Early Winter, Festival
9th Spoke	Margashira (November)	Winter, Cleansing
10th Spoke	Pausha (December)	Cold, Dormancy
11th Spoke	Magha (January)	Mid-Winter, Reflection
12th Spoke	Phalguna (February)	Late Winter, Preparation

Each spoke not only marks the passage of time but also connects to the spiritual significance of the Sun's journey through the sky.

As we conclude our tour of the Konark Sun Temple, we're left in awe of the ancient ingenuity and artistry that has stood the test of time. This magnificent structure, with its intricate carvings, majestic architecture, and rich history, is a testament to India's cultural heritage. The temple's unique blend of spirituality, mythology, and astronomy has made it a fascinating destination for visitors from around the world. As we bid farewell to this incredible monument, we're reminded of the importance of preserving our cultural treasures for future generations to cherish and appreciate.

Conclusion:

The educational tour was highly beneficial for the students. It not only provided exposure to academic and research opportunities but also created an engaging learning environment beyond the classroom. This tour provide the students with the opportunity of learning through travel specially to places that they may not otherwise get to visit. Educational trip provide valuable educational opportunities away from the classroom without using textbooks and other tools which are used in normal education settings. Student on educational trip can open learn while having fun and also got to know more about ourselves and our mates, our professor also create a healthy and sensible environment which makes us more comfortable and legible to explore, the last but not least we conclude our trip to Puri, Odisha, we're left with unforgettable memories and a deeper appreciation for the region's rich cultural heritage. From the majestic Konark Sun Temple to the vibrant streets of Puri, our journey has been a fascinating exploration of history, spirituality, and natural beauty. At Govardhan Math Shankaracharya Aasharam we've experienced the warmth of Odisha's hospitality, savored its delicious cuisine, and discovered the resilience and creativity of its people. As we bid farewell to this enchanting destination, we're reminded of the importance of preserving our cultural treasures and the value of exploring new horizons. At last we heartly thanks to our college authority and our Mathematics department for cooperation and support.